Strategic Implementation Plan (SIP) for a Community-based Unified Forecast System

NGGPS Global Model Suites Planned for NCEP/EMC Operations

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**SIP/EIP project accomplishments towards development of Unified Forecast System to date:**

- **FV3-Global Deterministic Forecast System (FV3-GFS)**
  - FV3 Dynamic Core adopted into NEMS framework; separated GFS physics using IPDv4; implemented GFDL Microphysics, stochastic physics and write grid component.
  - FV3GFS Beta implementation is on target for Q3FY18 (May 15, 2018), NCEP to run two global models (current operational GFS and FV3GFS Beta) in parallel this summer.
  - FV3GFS V1.0 Public Release is planned for March 2018.
  - Advanced version of FV3GFS will replace current operational GFS in Q2FY19.

- **FV3-Global Data Assimilation System (FV3-GDAS)**
  - Transitioned the 4D-Hybrid En-Var data assimilation framework for FV3-GFS; configured and optimized the cycled data assimilation experiments including stochastic physics.
  - Preparing FV3-GFS for assimilating new satellite datasets (GOES-16, NOAA-20).
  - Preparing FV3-GDAS to accommodate increased vertical resolution and higher model top for Q2FY19 implementation.
SIP/EIP project accomplishments to date:

- **FV3-Global Sub-Seasonal Ensemble Forecast System (FV3-GEFS)**
  - Finalizing FV3GEFS Reanalysis and Reforecast Configurations
  - FV3GEFS Reforecasts and operational implementation in Q4FY19 will include extension to weeks 3&4 using 2-Tier SST approach and stochastic physics
  - Planning for increased ensemble membership and increased forecast model resolution
  - Global Wave Ensembles will be absorbed by GEFS in operations.
  - NGAC chemistry component will be integrated into GEFS Control Member

- **FV3-Seasonal Forecast System (FV3-SFS)**
  - Benchmarked UGCS GSM+MOM5+CICE5 for sub-seasonal forecast evaluation
  - Testing GSM+MOM6+CICE5 for sub-seasonal forecast evaluation
  - Developing FV3+MOM6+CICE5 coupled system using NEMS/NUOPC mediator.
  - GFDL to support benchmarking FV3+MOM6+SIS2 coupled system using FMS
  - Planning on developing unified data assimilation for marine components including ocean, ice and waves using Marine JEDI
NGGGS Global Model Suites Accomplishments

500-hPa HGT ACC
NGGPS Global Model Suites
Accomplishments

FV3GFS precip skill scores are improved with either Zhao-Carr MP or GFDL MP

CONUS Precip ETS and Bias Scores
NGGPS Global Model Suites Accomplishments

http://www.emc.ncep.noaa.gov/gmb/emc.glopara/vsdb/prfv3rt1/

Real-time cycled experiment with data assimilation
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Accomplishments

RMS O-F (2016010400-2016011200)

Dual resolution C384/C192 vs C384/C96
same analysis and forward operator grid (C192)
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Accomplishments

Northern Hemisphere 500hPa Height
Continuous Ranked Probability Skill Scores
Average For 20161001 – 20161010

FV3GEFS 500 hPa CRPS

Northern Hemisphere 500hPa Height
Ensemble Mean Anomaly Correlation
Average For 20161001 – 20161010

FV3GEFS 500 hPa ACC
NGGPS Global Model Suites
Accomplishments

Bivariate Correlation Skill for MJO Index (RMM1+RMM2)
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Project Issues

• SIP project issues:
  
  o FV3-Global Deterministic Forecast System (FV3-GFS)
    o COMPUTATIONAL RESOURCES FOR Q2FY19 IMPLEMENTATION
    o Advanced physics development and testing at risk
    o Need accelerated development of CCPP, CROW, and MET+
    o Incomplete code documentation; lack of adequate training
  
  o FV3-Global Data Assimilation System (FV3-GDAS)
    o Increased vertical resolution and higher model top requires finalizing advance model configuration
    o Need accelerated development of JEDI
    o Stratospheric biases are still a concern
    o COMPUTATIONAL RESOURCES FOR Q2FY19 IMPLEMENTATION
NGGPS Global Model Suites
Project Issues

• SIP project issues:

  o FV3-Global Ensemble Forecast System (FV3-GEFS)
    o COMPUTATIONAL RESOURCES FOR Q4FY19 IMPLEMENTATION
    o Stochastic physics and ensemble spread
    o Physics mods for sub-seasonal forecast extensions
    o Extremely slow progress on FV3 based coupled system development

  o FV3-Seasonal Forecast System (FV3-SFS)
    o Extremely slow progress on FV3 based coupled system development
    o Need accelerated development of Marine JEDI
    o Aerosol model development and data assimilation at risk
    o Lack of adequate resources
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Team Coordination and Dependencies

- **General Team Coordination:**
  - Multiple meetings each week within EMC and with core partners
  - Weekly FV3GFS and FV3DA technical meetings
  - Bi-weekly Advanced Physics and Dynamics meetings
  - Regular interactions with GFDL, NASA/GMAO, GMTB and CGD
  - Regular review of global modeling projects and coordination among various projects
  - Content and Project management through Vlab Redmine and Wiki/Forums

- **Dependencies**
  - Deliverables from almost all SIP WG and EIP Projects
  - JEDI, CROW, MET+, Infrastructure, Software Architecture, code management and governance
  - Documentation and training